US009636714B2

(12) **United States Patent**
Alvarez et al.

(10) **Patent No.: US 9,636,714 B2**
(45) **Date of Patent: May 2, 2017**

(54) **COMPRESSION MOLDED ARTICLES EMPLOYING CIRCUMFERENTIAL SURFACES HAVING FRICTION-ENHANCING PATTERNS TO CONTACT SUBSTRATES DURING WET CHEMICAL PROCESSES**

(71) Applicant: **Applied Materials, Inc.**, Santa Clara, CA (US)

(72) Inventors: **David P. Alvarez**, San Jose, CA (US); **Jim K. Atkinson**, Los Gatos, CA (US)

(73) Assignee: **APPLIED MATERIALS, INC.**, Santa Clara, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 132 days.

(21) Appl. No.: **14/616,704**

(22) Filed: **Feb. 7, 2015**

(65) **Prior Publication Data**

US 2016/0228923 A1 Aug. 11, 2016

(51) **Int. Cl.**

B08B 1/00	(2006.01)
B08B 1/04	(2006.01)
B08B 13/00	(2006.01)
B29C 43/02	(2006.01)
H01L 21/67	(2006.01)
B29K 27/12	(2006.01)
B29K 75/00	(2006.01)
B29L 31/00	(2006.01)

(52) **U.S. Cl.**

CPC ***B08B 1/002*** (2013.01); ***B08B 1/04*** (2013.01); ***B08B 13/00*** (2013.01); ***B29C 43/021*** (2013.01); ***H01L 21/67046*** (2013.01); *B29C 2043/025* (2013.01); *B29K 2027/12* (2013.01); *B29K 2075/00* (2013.01); *B29L 2031/7728* (2013.01)

(58) **Field of Classification Search**

CPC B08B 1/002; B08B 1/04; B08B 13/00; B24B 37/04; B29C 43/021; H01L 21/67046

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

6,003,185	A	12/1999	Saenz et al.
2006/0189465	A1	8/2006	Brown et al.

(Continued)

FOREIGN PATENT DOCUMENTS

JP	2013-506997	A	2/2013
KR	10-0376564	B1	3/2003

OTHER PUBLICATIONS

International Search Report dated Apr. 29, 2016 for Application No. PCT/US2016/013592.

Primary Examiner — Shay Karls

(74) *Attorney, Agent, or Firm* — Patterson + Sheridan, LLP

(57) **ABSTRACT**

Compression molded articles employing circumferential surfaces having friction-enhancing patterns to contact substrates during wet chemical processes are disclosed. An article such as an annular body may be formed by a compression molding technique. By including a patterned surface as part of an outer circumferential surface of the annular body, frictional contact between the annular body and the substrate may be enhanced as friction-reducing fluids associated with a wet chemical processes may be directed away from the desired friction contact area between the annular body and the substrate. In this manner, frictional contact may be enhanced and the substrate may be effectively positioned and moved during the wet chemical process to improve the effectively of the process.

20 Claims, 7 Drawing Sheets